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The project method in vocational training

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InWEnt

InWEnt – Internationale Weiterbildung und Entwicklung gGmbH (Capacity Building International, Germany) - is an organisation for international human resource development, advanced training and dialogue. Established through the merger of the Carl-Duisberg-Gesellschaft (CDG) e.V. and the German Foundation for International Development (DSE), it can draw on decades of experience accumulated by the two organisations in the field of international co-operation. Its practice-oriented programmes are directed at specialist staff and managers, as well as decision-makers from business and industry, politics, public administration and civil society from all parts of the globe. Its Development Policy Forum arranges high-calibre international policy dialogues on subjects of current concerns in the field of development policy.

Division 4.01 of InWEnt has its seat in Mannheim and conducts on behalf of the Federal Ministry for Economic Cooperation and Development (BMZ) advanced training programmes. Under the banner of "sustainable development", its work focuses on questions of technology cooperation, system development and management in the field of technical and vocational education and training. Its dialogue and training programmes are targeted at decision-makers from the public and private sectors, junior managers and multipliers from vocational training systems.

Introduction

From 2003 onwards, InWEnt´s Division Technological Cooperation, System Development and Management in Vocational Training is to present a series on everyday practice in vocational training.

The intention of this series is described in the title itself ("Beiträge aus der Praxis der beruflichen Bildung" = series on everyday practice in vocational training). The division aims to support its programs of international personnel development in the above-mentioned areas with technical documentation in both printed and electronic form.

These reports

- originate in the partner countries, taking into account specific situational demand
- will be tested with and for experts in vocational training in the partner countries in conjunction with respective practice-oriented training programs on offer, and
- with a view to global learning, will be improved and adapted prior to publication according to the recommendations of the partners or the results of the pilot events.

Thus, the Division Technological Cooperation, System Development and Management in Vocational Training is applying the requirements of InWEnt´s training program to its own products in the above faculties: i.e. these can only be as good as their practical relevance for the experts of vocational training systems in the partner countries.

To this effect, we look forward to critical and constructive feedback from all readers and users of these special series.

This manual is one of an entire series of InWEnt publications that have been produced as a result of training seminars and courses carried out in cooperation with the vocational training institute SENATI in Peru.

Our special thanks go to Prof. Tippelt of Munich University and Mr. Amorós from the "International Cooperation Office", who both made invaluable contributions to these activities.

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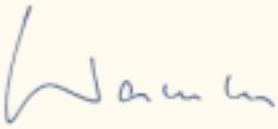

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1 Introduction to the topic

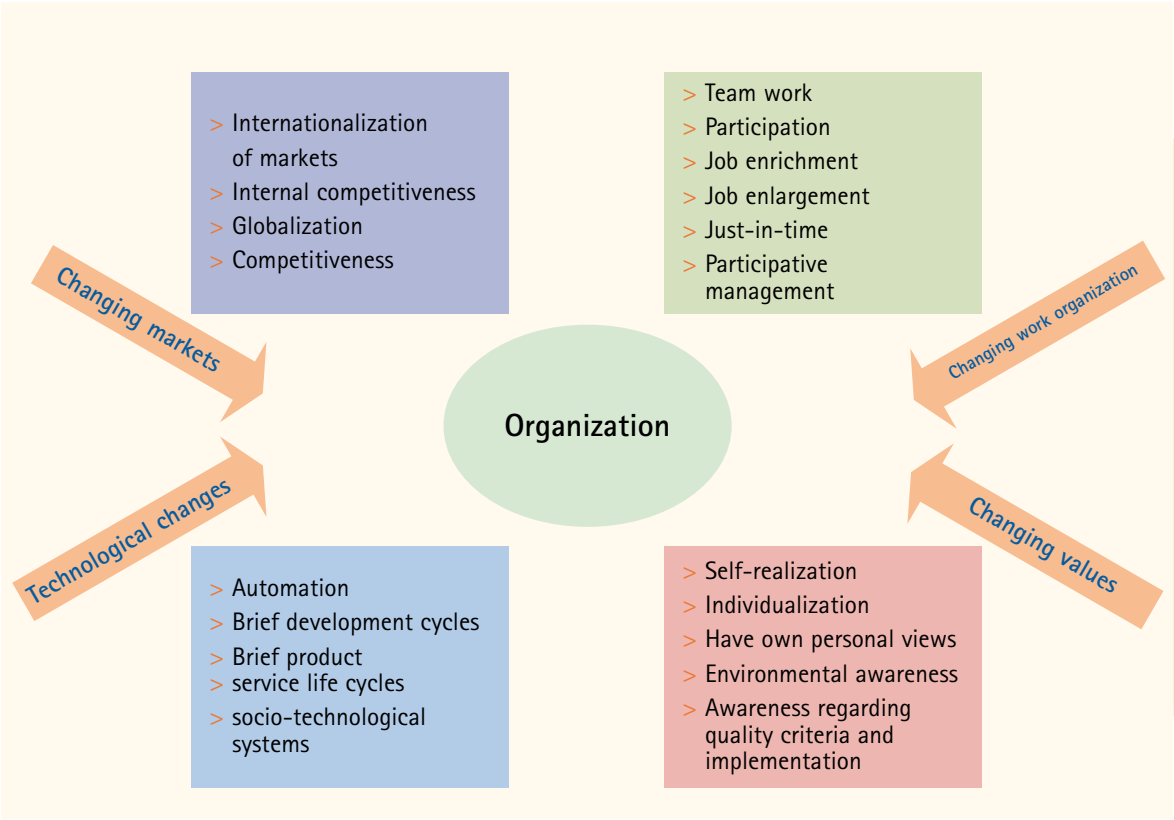
greater versatility and flexibility

Current work organization practices call for teaching-learning methods able to provide an answer to changes affecting cultural, economic, labour and technological fields. At a time in which each new cycle of innovation is increasingly brief, training institutions need to become more versatile and flexible, adapting themselves to the new structures developing in the professions. Internationalization, the globalization of markets and increased competitiveness oblige companies to tailor their products to new technological requirements, productive processes, services and demand for skills. The taylorist model, whether for reasons of competitiveness or due to socio-cultural changes is rapidly being replaced by "socio-productive" training models. More and more work groups, islands of production and circles of production are springing up, whereas the taylorist working structures have been done away with. It has been said elsewhere that the "just in time" learning model now represents one of the great challenges confronted by existing training models and the learning methods these employ.

multipurpose, multifunctional and flexible training

In order to adapt to changing trends (see Figure 1, Changes) in the areas of the market, work organization, technology and social values, vocational training must become multipurpose, multifunctional and flexible. The process of change demands that the current lines of demarcation between theory and

Figure 1: Changes



practice, planning and implementation, thinking and acting be reduced by means of a more global and integrated form of vocational training. But it is also true that the demand for activity based interdisciplinary and social skills is rarely fully compatible with the teaching-learning methods selected.

an interactive and self-directed learning process

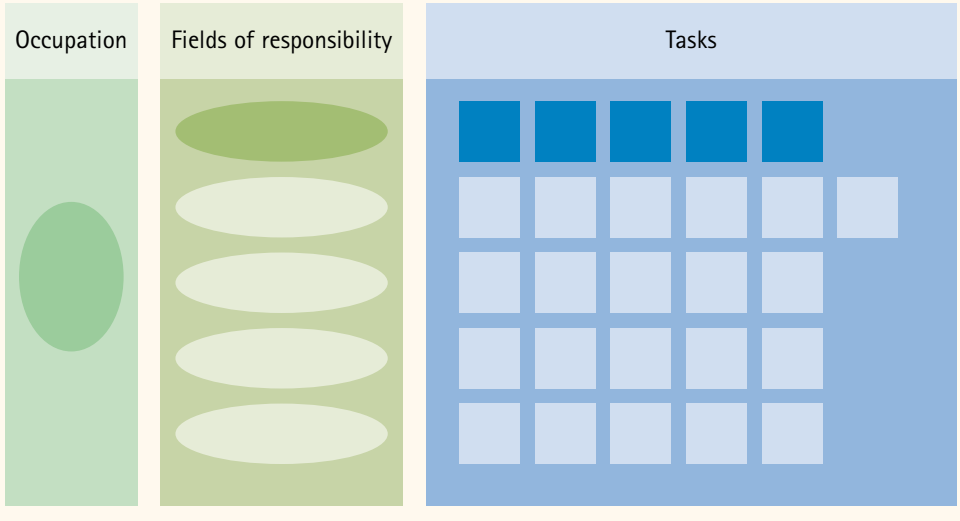
In fact, one of the main objectives of vocational training is to provide not only an adequate answer to these needs but also a greater flexibility, thus enabling students to benefit from an interactive and self-directed learning process – one with a capacity for continual evolution and occupational re-adaptation. This is one of the greatest challenges currently facing the vocational training industry. Vocational training should be seen as more than a simple tool used to obtain a diploma or professional certificate. It should also enable practices to be updated in accordance with existing vocational training trends, as well offer apprentices the possibility of changing occupations and be able to provide an answer to the problems inherent to the professional labour world

The vocational trainer's role can no longer be limited to ensuring that students learn the basic theories of certain areas of knowledge. They must now also be encouraged to think for themselves, to select and prioritize information, to draw up work-plans and to coordinate resources. But this cannot be achieved solely through the application of traditional teaching methods, based as these are on teacher's presentations and textbook learning.

Within this referential framework, and before expounding the characteristics and various phases of the project method, we need to determine the precise relationship between the project method, the curriculum, and skills based training.

2 Curriculum and the pro-

Figure 2: Occupational participatory analysis occupational matrix



ject method

analysis and development

The central idea of the project method is that a group of students or apprentices analyze and develop a “real-life“ problem or tackle a present day theme within a preset time limit, working independently and with the division of tasks clearly defined.

directly linked to areas of responsibility or specific tasks

The themes selected for the implementation of the project should be directly linked to specific areas of responsibility or tasks that have been determined by information compiled by means of a process of occupational analysis - such as, for example the application of the DACUM system.

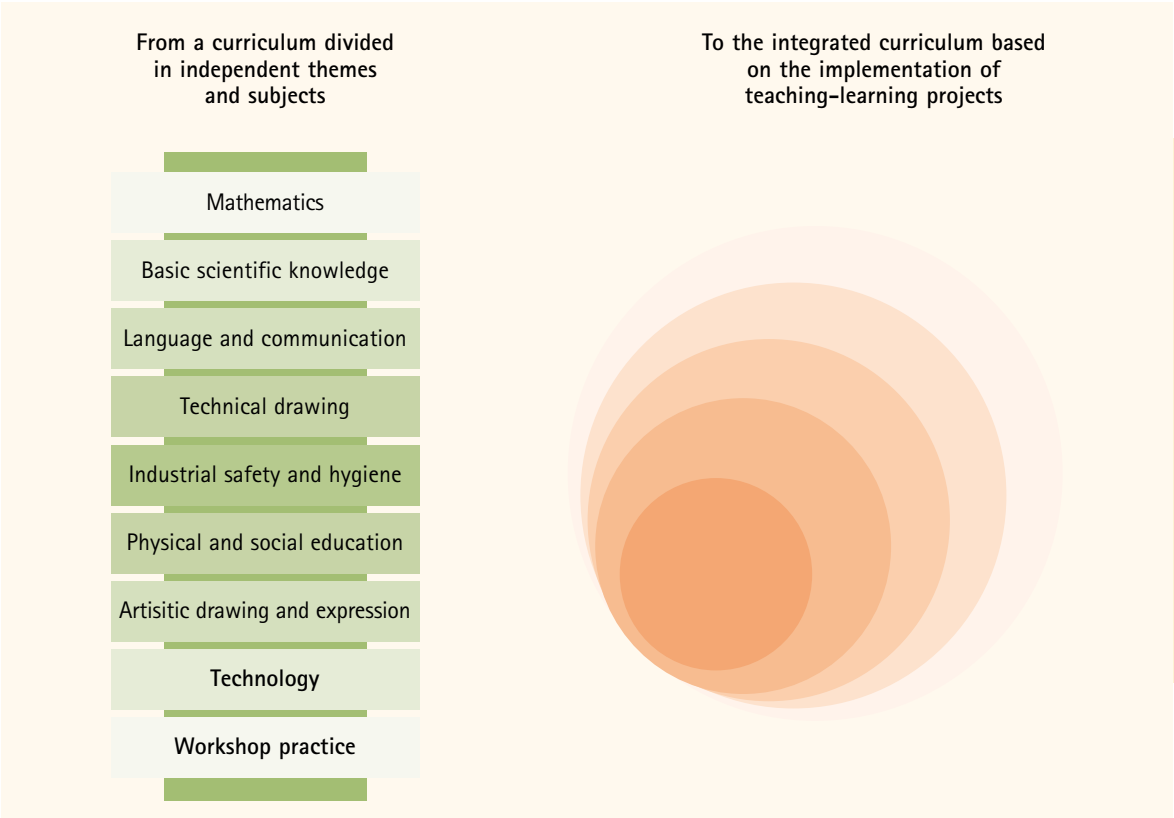
a part of the curriculum

As can be seen in Figure 2, Occupational participative analysis, taking as our point of reference the SENATI occupational analysis model, project objectives or tasks are defined by means of occupational analysis. It is important to emphasize that the project should not in itself be seen as a global curriculum but rather as a component or integrated module of this.

projects for each “real-life“ problem

In principle, the project method can be applied to each “real-life“ problem or task, always taking account of the fact that the main objective or function of the project should be linked to the carrying

Figure 3:



out of practical tasks. It is precisely this replacing of passive/receptive with active/situational experience based learning models that forms the nucleus of activity based vocational skills learning.

the interdisciplinary curriculum

The project method cannot be termed a simple teaching-learning model, as its sphere of action goes much further than any curricular limitations. It could be said that the project method broadens the interdisciplinary nature of the curriculum "Project based training processes reject the clearly defined structuring of interrelated subjects or themes replacing this with a focus based on the complexity of the reality of life itself and the working world.

reflecting on the consequences of the new curricular framework

The project method replaces systemization by themes or subjects with a logic focused towards the carrying out of interdisciplinary tasks. At a curricular level, once again taking SENATI as the model, organization by independent themes and subjects makes way for an integrated curriculum based on the implementation of teaching-learning projects. (See Figure 3, The integrated curriculum). The successful application of this curricular model requires a process of reflection over the most immediate consequences of the new curricular framework, including the role of the trainer and the process itself. The following possibilities should be considered:

- The inclusion of new macro content and methodology options in the curriculum.
- A more flexible treatment given to certain themes or subjects, in order to facilitate possible curricular adaptations, including individualization in the case of especially problematic learning situations.
- A less rigid organizational structure should the implementation of the project adversely affect a vocational training centre's distribution of classrooms, timetable or student management.
- The implementation of projects well adapted to the specific reality of both students and environment, by means of prior pedagogical, sociological and psychological needs analysis.

3 Linking the project method to competence based training

A curriculum congruent with present day trends should be based on the development of personal and social competences and the encouragement of student independence.

development of methodological, social and individual competences

In the past, occupational/professional competence tended to be focused solely on technical areas directly linked to a specific area or theme. In the current environment, however, such a focus is clearly inadequate. Professional action competence in today's market calls for not only increased knowledge but also the development of methodological, social and individual competences. And it is here, in the area of conveying interdisciplinary competences, that the project method has an increasing relevance – not only with respect to in-company training schemes but also for schools or vocational training centres.

transmitting interdisciplinary competences

The project method promotes a creative learning process based on specific objectives. Not only technical but also interdisciplinary competences are devel-

oped, using as a base students' own experiences. A competence-based training programme encourages students to become the agents of their own training, occupational development and professional improvement. Independence is stimulated through the carrying out of teamwork activities and the use of personal initiative, enabling students to develop original and concrete problem-solving solutions to diverse vocational training situations.
The key to the efficiency and acceptance of the project methods is that it is based around the so-called "characteristics necessary for the development of competences", namely:

- Interdisciplinary character
- Projects based learning process.
- Self directed learning techniques
- Resources-aided learning
- Team work

fulfils all necessary requirements

As can be seen, the difference between the project method and other, more traditional, forms of learn-

Figure 4: Characteristics necessary for the development of competences

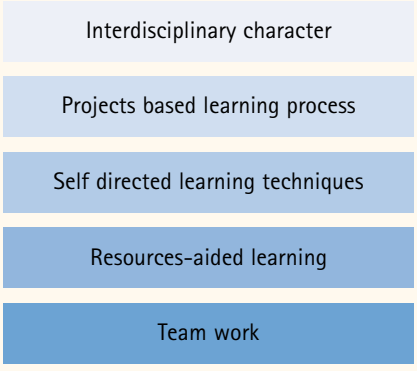
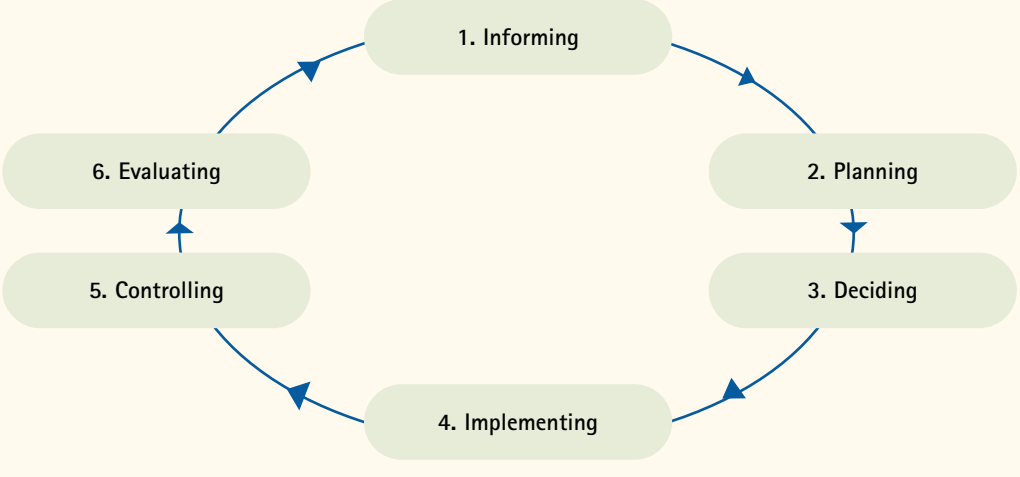


Figure 5: Complete activities mode



ing – such as the four steps method, the expositive method, the magistral lesson method, etcetera, is that the former fulfils all the necessary requirements enabling it to be used as a didactic tool in the development of competences (See Figure 4, Characteristics necessary for the development of competences).

the six phases of the project

The project method permits an "ideal mode" of complete activities to be carried out in the following six phases: (See Figure 5, Complete activities mode).

> Informing
> Planning
> Deciding
> Implementing
> Controlling
> Evaluating

putting into practice the different phases of the project

What is meant by complete activities? – Focusing on the following areas of expertise for each phase of the project.

> Technical competence (e.g. technical knowledge)
> Methodological competence (e.g. planning and design of the project sequence)
> Social competence (e.g. cooperating with other members of the project)
> Individual competence (e.g. readiness to work as a team)

The project method is especially relevant in this area, as it is much more than a simple form of curricula development, allowing for the active and constructive implementation of the above-mentioned competences. The project methods can be a very efficient learning situation creation tool, replacing traditional magistral or expositive explanations.

4 Phases of the project method

Project activities can be grouped in phases. The following describes the steps to be followed to plan projects as learning strategies (see Figure 6, Phases of the project method).

4.1 Informing

compiling the necessary information

In the first phase, students/apprentices should compile the information needed to solve the proposed problem or task, making use of available sources of information, such as technical textbooks, specialized publications (e.g. magazines), manuals, videos, etcetera.

high level of identification and motivation

Project objectives/tasks should be defined in accordance with apprentices' experience and carried out with the participation of all group members, to ensure a high level of identification and motivation.

familiarizing apprentices with the project method

The trainer's first task is to make sure that apprentices are familiarized with the project method and – with full group participation – that the themes or areas to be dealt with are appropriate. A single student's proposal may well form the central idea for a project, but in order to put this into practice coherently, at the same time as ensuring its relevance to the whole group, other factors relating to the training centre environment need to be taken into consideration.

encouraging collaborative work

The project method represents a great opportunity to break the cycle of individualism and foment collaborative work in the search for common solutions to a proposed problem. Successful teamwork requires a cordial atmosphere and an open climate to facilitate the activities that form its base. It is therefore extremely important, especially during this initial stage, that trainers be able to direct and advise, with a view to encouraging and developing attitudes of respect, understanding and participation – as many students will often be unaccustomed to group or teamwork.

4.2 Planning

adapting or changing

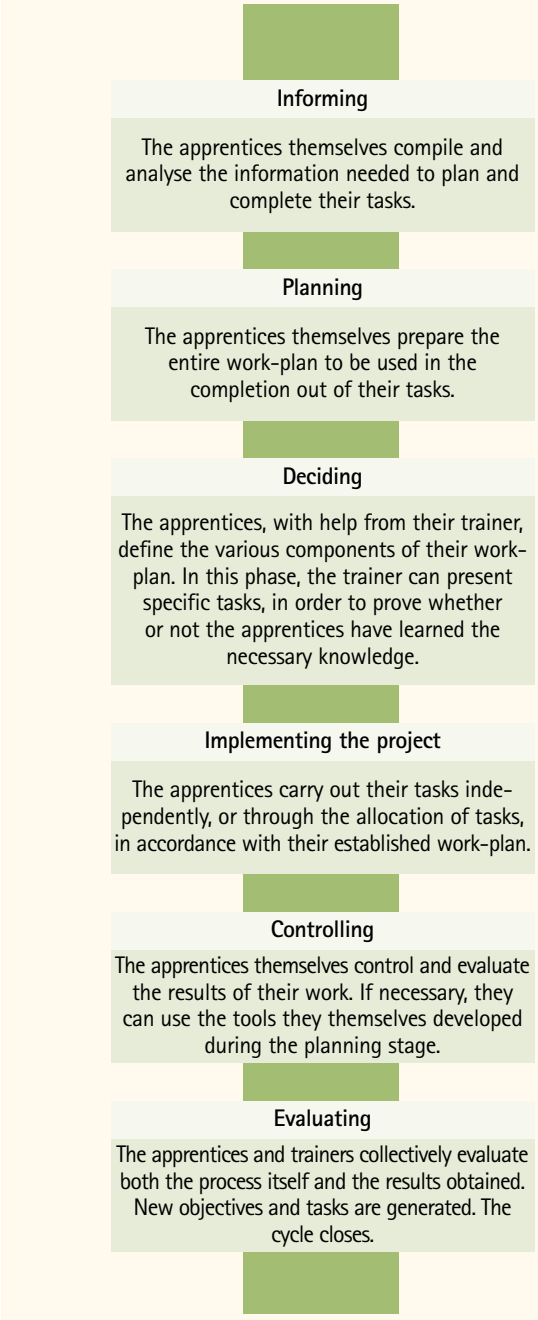
The planning phase is characterized by the setting up of the work plan, the structuring of the methodological procedures and the planning of the tools and resources to be used. It should be stressed that simply preparing the work plan does not always guarantee that this will be correctly implemented. It is therefore necessary that the planning phase be extended throughout the project. Although the procedure defined in the plan should be followed whenever possible, it is important that a margin exist for making any modifications or changes required. During the planning phases, the division of tasks between group members should be clearly defined. The following serves as an example of this:

- All group members should participate actively and collaboratively in the execution of the project.
- Different work-groups should be formed for each part/component of the project.

organizing on an individual level

The amount of material to be used and the speed of learning will generally vary from one apprentice to another. It is quite feasible for a project to

Figure 6: Phases of the project method



be organized and time limits allotted on an individual basis, in accordance with individual students' needs, motivation and progress.

intra and inter-group integration

Project methods learning is a technique based on the principles of socialization. Students' different personalities influence the forming of the work-groups. It is therefore necessary that trainers ensure that both intra and inter-group relationships be as close and efficient as possible, with any subsequent modifications beneficial to group dynamics.

4.3 Deciding

collective decision-making involving trainer and group members

Before commencing the practical work phase, apprentices should take group decisions about the alternatives or problem solving strategies to be pursued. Once a course of action has been collectively decided upon, this should be discussed at length with the trainer, to ensure that strategies or procedures be established by means of a truly collective decision-making process involving the trainer and all the members of the group. It is thus possible that the decisions made differ somewhat from those originally anticipated by the trainer.

learning to evaluate problems

During this decision making phase, the role of the trainer is to comment on, discuss and – if necessary – modify the problem solving strategies proposed by students. It is important that students learn to evaluate the potential problems, risks and advantages presented by each possible alternative.

social communication process

One of the foundations of projects based learning is the social process of communication established within the group, which permits students to take decisions collectively.

4.4 Implementing the project

activities based on experience and investigation

In the implementation phase, activities based on experience and investigations take precedence. Creative, independent and responsible activities are carried out and analyzed. Each member of the project should perform his or her tasks according to the agreed work-plan or division of work.

the feedback process

During this phase, partial results are compared with the initial work-plan and any necessary modifications made – at both planning and execution levels. This process of feedback enables partial results to be revised and serves as a self-control and evaluation tool for both individual and group.

carrying out tasks as independently as possible

Tasks should be carried out as independently as possible, although this does not imply that students have the sensation of being alone. It should be underlined that practical based learning needs to comply with certain conditions in order to be effective. Apprentices encouraged to correct their own mistakes will learn as a result but will generally also require expert guidance from their trainer, who, being familiar with the teaching-learning rules in the context of his own course and students will help them achieve better results. The trainer must always be there for his apprentices, assuming a directly participative role whenever advice or supports are needed – as well as, of course, being a motivator at all times. This motivational role includes a social and emotional side, which is very important to the students, who will expect a trainer to acknowledge a task well done.

4.5 Controlling

the self-controlling phase

Once a task has been completed, students should

move into a self-controlling phase, where they can learn to better evaluate the quality of their own work. Here questionnaires or programmed tests similar to formal exams are often used, enabling students to discover and – if possible – correct any mistakes they may have committed during the implementation of the project.

During this self-controlling phase, the trainer should assume the role of advisor or support-person, participating directly only if and when students fail to reach agreement over the evaluation of their results.

4.6 Evaluating

collective discussion of results

Once the project is complete, a final discussion should be conducted, in which trainer and students collectively discuss and comment on the results obtained. The trainer's main role is that of a facilitator, allowing students to conduct feedback – related not only to the final product but to the whole process – and to define any mistakes committed plus qualify the results obtained – with regard to what has actually been achieved and what was originally expected. The feedback should also include the effectiveness of the work carried out and the personal experiences gained, as well as considering group dynamics and processes. Students should then formulate proposals for the improvement of future projects. This final discussion can also function as an important source of feedback for the trainer himself, who should also optimize the planning and execution of future projects.

flexible mechanics and open criteria

These observations can be summarized as the belief that the mechanics of planning and carrying out of projects should be flexible and based on open criteria students should be ensured a high level of participation in the decisions governing the make-up of the groups as well as the content and organization of the learning process.

the trainer's role

The trainer's role moves from that of a "teacher" simply transmitting knowledge and skills, to one of a learning process advisor, coordinator and support-person. The trainer instigates, organizes and stimulates the learning situations. The apprentice is led towards self-learning and motivated to plan independently and collectively, and to implement and evaluate the learning process.

full group participation

Taking account of individual experiences and interests, needs and characteristics, the participation of all group members in each phase of the project enables students to remain motivated and identified with its aims and objectives, helping to make the learning process more productive.

5 The trainer's role

This learning model requires trainers to take a very different role to that common in traditional teaching. Trainers cease to be mere "knowledge transmitters" becoming above all facilitators, designers and learning advisors. Trainers instigate, organize and stimulate learning situations. Apprentices are led towards self-learning and motivated to plan independently and collectively, and to implement and evaluate the learning process.

Changes in the trainer's role:

> The trainer should meticulously prepare the learning process.
> The trainer should remain in the background as much as possible, taking note of what works and what doesn't.
> The trainer should be on hand in order to answer questions during the carrying out of the project.
> The trainer should encourage students to learn for themselves and to formulate "correct" questions.
> The trainer should encourage students to self-evaluate their work and experiences
> The trainers should enable "the forgotten" to be remembered and, develop with students the corresponding technical theory based on practical experience.
> The trainer should pay special attention to the areas of cooperation, organization of tasks and group or teamwork methodology, addressing them through conversations with the apprentices.

6 Characteristics of the project method

1. Related to real situations
The proposed tasks and problems should be directly related to "real-life" situations inherent to the selected occupation.

2. Practical relevance
The proposed tasks and problems should be relevant to practical areas of the selected occupation.

3. Students based approach
The selected project theme and its execution should be focused on the interests and needs of the apprentices.

4. Product based approach
The results obtained should be both relevant and beneficial, being made available to others for evaluation and criticism.

5. Action based approach
Apprentices should carry out specific activities independently, on both intellectual and practical levels.

6. A holistic-integrated learning process
The project method should combine cognitive, affective and psychomotive learning objectives.

7. Self-organization
The defining of objectives, planning, implementation and control should in the greater degree be the responsibility of the apprentices themselves.

8. Collective implementation
Apprentices should learn and work collectively during the implementation out of the project.

9. Interdisciplinary nature
The implementation of the project should enable different areas of knowledge subjects and disciplines to be combined.

7 How the project method can be applied

an interactive process between learning and occupational activity

From a learning theory point of view, the project method can be classified as an interactive process that forms a bridge between the learning process and occupational activity; between the individual and group. The various forms of self-control applied throughout the process lead apprentices to a continuous reflection on their own performance (self-determination and responsibility assumed by all group members).

detailed and precise planning of the steps to be followed

It is precisely this continuous process of reflection differentiates the project method from the simple completing of a production process (product). The final product, although still an important aspect, is only one of the project's components. A project has a much wider scope, being based on an idea that needs to be put into practice – an idea that is commented on, discussed, verified, that decisions are taken over and the putting into practice of which is evaluated. And this can only be achieved by on a detailed and precise planning of the steps to be followed.

complementing the projects idea with other methods

The project method on its own cannot be considered a methodological concept. It will always need to be complemented by other learning methods that can facilitate its implementation. By way of example, during a certain point phase of the project it may prove convenient to make use of the demonstration, four steps, or conceptual mapping methods, etcetera.

a diversity of learning methods

In all its phases, the project method allows of a wide range of learning models to be incorporated into the learning process – ranging from traditional learning models such as the four steps method, to more innovative and up-to-date models like the conceptual mapping method. Although it would be a mistake to assume that traditional learning methods can be done away with, the increased complexity of skills training requirements has made it necessary to develop other learning methods in order to offer more effective solutions.

the result of a whole pedagogic tradition

Concepts such as the project method, work projects and projects focused learning are terms that have come to form part of our current pedagogic language in the area of vocational training. It should be emphasized however, that these terms have their historical roots at the beginning of the twentieth century. The development of the project method belongs to an historic evolution directly associated with training needs, and can serve us as a reference point for the development of learning strategies capable of the further projecting vocational training in a competitive and rapidly changing environment. Consequently, we can affirm that the project method is the result of a whole pedagogic tradition and one which stretches back over one hundred years.

adapting to new skills training demands

This didactic concept grew in importance again in Germany at the beginning of the seventies – undergoing a kind of didactic renaissance. And at this moment, it is the project method the teaching-learning model considered best able to adapt to the demands for new skills training. This is mainly due to the three aforementioned basic principles that characterize all projects.

Focused towards a real product

The project method allows a specific product to be developed.

Holistic learning

The practical work base processes are interdisciplinary.

Self-organization

The apprentices themselves participate in designing their own working-learning process.

8 Advantages of project-based learning

- Apprentices take their own decisions and learn to act independently.
- The process motivates apprentices, as it is they themselves that develop problem-solving solutions, plan and direct their own project.
- The learning themes can be easily transferred to similar situations, thus enabling strategies and concepts to be compared, as well as allowing the correct solution to be considered from different perspectives, all of which facilitates the learning process.
- Self-confidence and initiative-taking capacities are strengthened.
- The apprentices themselves set up their own learning situations.
- A logical understanding of the problem or task to be tackled helps acquired knowledge and skills to be retained.
- The learning process is integrated (cognitive, affective and psychomotive learning objectives).
- Apprentices develop inductive skills by analysing specific cases, deduce principals and relations, formulate hypotheses that are proved through practical application or disproved and replaced by newly induced hypotheses. In other words, apprentices apply scientific thinking to the learning process.
- Higher education learning techniques are included (learning based on activity-based problem-solving).
- Different concepts, values and ways of thinking are assimilated – especially in the areas of cooperation and conflict solving.

9 Limitations of project-based learning

evaluating efficiency or inefficiency

Project methods based training is not always the most effective model and cannot necessarily be applied to every teaching-learning process. Its efficiency or inefficiency can best be evaluated by its "cost-effectiveness", that is, in this context, a comparison between the efforts made or dedication shown by apprentices and the degree of success obtained in contrast to other learning models.

- It can sometimes prove difficult to get poorly motivated students started in this form of learning. Students with a history of failures generally have a low curiosity level and can be reluctant to begin a search for new concepts, as a result of previously negative experiences.
- If students do not have any previous experience with the proposed subject matter it is difficult to use the project method, unless the trainer first presents the students with tasks that they can carry out and then use as a base for the project itself.

10 Summary

high preference given to the project method

The project method is given high preference among the in-company vocational training programmes currently implemented in Germany. This does not mean, however, that companies should simply discard traditional methods. The application of these can be of great use for certain theoretical-practical learning situations. Nonetheless, the need to train apprentices to adapt themselves to new ways of organizing work means that more and more companies are turning to methods that combine subject matter with technical methodologies learning. And these same teaching-learning models demand that students better develop their own initiative taking abilities and interdisciplinary competences (key qualifications).

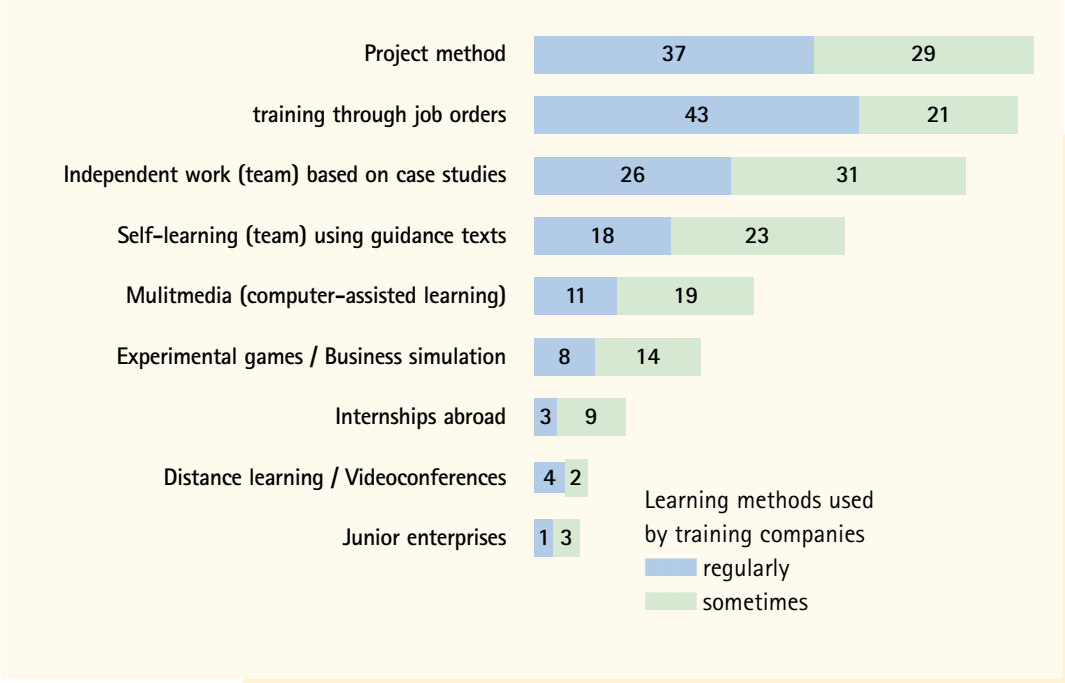
working and communicating as a team

Projects based teaching-learning forms part of a set of methodologies based on the realization of group-work, inter-group communication and multifunctional teamwork.

a wider didactic-methodological scope

As a recent survey carried out by the Federal Institute for Vocational Training (BIBB) illustrates (see Figure 7, Learning methods), the project method is currently the didactic tool most used by German training companies, and there are strong signs to suggest that it will continue to be the vocational training model with the widest didactic-methodological scope among all the possible alternatives.

Figure 7: Learning methods used by training companies



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